

PART I. of a new work on practical physics, by Prof. W. F. Barrett, of the Royal College of Science for Ireland, will shortly be published by Messrs. Percival and Co. It will treat of physical processes and measurements, and the properties of matter.

THE University Correspondence College has issued its calendar for 1892-93. The Principal, in his report, shows that the college has been in many ways remarkably successful.

THE calendar of the Imperial University of Japan for 1891-92 affords ample evidence that the authorities of this important institution are doing everything in their power to secure that it shall meet the needs of the present age. We may note that in the college of science the following seven courses, each of which extends over three years, have been established: Mathematics, astronomy, physics, chemistry, zoology, botany, and geology.

IN the last sentence of the fourth paragraph of Lord Kelvin's article on "Generalization of Mercator's Projection Performed by aid of Electrical Instruments" (NATURE, September 22, p. 491), for "three" read "two." For corrections in paragraph 3, and in the last paragraph but one, see article "To Draw a Mercator Chart, &c.," in the present issue.

AN interesting new compound, the silver salt of the little known imide of sulphuric acid,  $\text{SO}_2\text{NAg}$ , has been obtained by Dr. Wilhelm Traube, in the laboratory of the University of Berlin, and an account of its properties, together with a considerable amount of fresh information concerning both the amide and imide of sulphuric acid, are contributed by him to the current number of the *Berichte*. Regnault long ago obtained a solid substance, which he regarded as a mixture of the neutral amide of sulphuric acid  $\text{SO}_2(\text{NH}_2)_2$  with ammonium chloride, by leading ammonia gas into a solution of sulphuryl chloride  $\text{SO}_2\text{Cl}_2$  in ethylene chloride.



The separation of the two substances, however, was but imperfectly effected, so that our knowledge of the amide itself is very vague. Dr. Traube now shows that the amide may be isolated without difficulty by the following process. The sulphuryl chloride is dissolved in fifteen times its volume of chloroform, which exerts no chemical action upon it, and dry ammonia gas is led through the liquid until the latter becomes saturated. The products of the reaction separate during the passage of the gas in the form of a white solid. The whole product is then agitated with water until the precipitate dissolves, the aqueous solution is separated from the chloroform and afterwards boiled in contact with oxide of lead or silver until all chlorine is removed from it. Upon filtering and evaporating the resulting liquid a syrup is eventually obtained, which only crystallizes with difficulty and would appear to consist of neutral sulphamide  $\text{SO}_2(\text{NH}_2)_2$ . It is an extremely deliquescent substance whose solution in water and dilute acids is not precipitated by salts of barium or by platinic chloride. Only after prolonged boiling with hydrochloric acid does decomposition occur with the gradual deposition of barium sulphate. The effect of boiling in the presence of acids would appear to be its conversion into ammonium sulphate. Sulphamide possesses the power of combining with the oxides of mercury, lead, and silver, to form white solid substances. Thus if mercuric nitrate, lead acetate, or ammoniacal silver nitrate are added to the aqueous solution of the amide these white solid compounds are precipitated. The mercury compound is insoluble in dilute nitric acid, while the lead and silver compounds are readily soluble, forming solutions which are perfectly indifferent to barium salts. It was from the compound containing silver that the interesting silver imide was obtained. Upon heating the silver compound to the temperature

of  $170^\circ$ - $180^\circ$  until ammonia ceases to be evolved, and extracting the residue with hot water feebly acidified with nitric acid, the new compound  $\text{SO}_2\text{NAg}$  separates upon cooling in long acicular crystals. Analyses have proved its composition to be that stated, and from its reactions it must be regarded as being the silver salt of sulphimide  $\text{SO}_2\text{NH}$ . The crystals are only soluble with difficulty in cold water, but more freely in hot water and readily in dilute nitric acid. The solution is not precipitated by barium nitrate. Even after removal of the silver by means of hydrochloric acid barium salts yield no precipitate; indeed, it requires long boiling with concentrated acid to effect any precipitation. It would appear that the solution left after removal of the silver contains sulphimide itself, and Dr. Traube is continuing his experiments with a view to the isolation of the latter compound.

THE additions to the Zoological Society's Gardens during the past week include a Grivet Monkey (*Cercopithecus griseo-viridis* ♀) from South Africa, presented by Mr. W. Howard; a — Lark (*Alauda calixox*) from China, presented by Mr. Gervase F. Mathew, R.N., F.Z.S.; two Common Kestrels (*Tinnunculus alaudarius*), British, presented by Mr. L. Bergasse; a Herring Gull (*Larus argentatus*), British, presented by Mr. H. H. Johnson; a Tuatera Lizard (*Sphenodon punctatus*), from New Zealand, presented by Capt. G. Eriksen; four Smooth Snakes (*Coronella levis*) British, presented by Mr. E. Penton, F.Z.S.; six American Green Frogs (*Rana halecina*), four Noisy Frogs (*Rana clamata*), from Canada, purchased; one Concave-casqued Hornbill (*Dichoceros bicornis*), from India, received in exchange; three Wild Swine (*Sus scrofa*) born in the Gardens.

#### OUR ASTRONOMICAL COLUMN.

COMET BROOKS (AUGUST 27, 1892).—*Astronomische Nachrichten*, No. 3119, contains the elements and ephemeris of Brooks's comet calculated by F. Ristenpert, assuming an elliptical orbit and the unit of brightness on August 31.5 as the unit of Br. :—

##### Elements.

T = 1892 Dec. 28.2870 M.T. Berlin.

$$\omega = 252^\circ 4' 23''.0$$

$$\Omega = 264^\circ 34' 45''.3$$

$$i = 24^\circ 43' 17''.1$$

$$\log q = 9.994136$$

##### Ephemeris for 12h. Berlin M.T.

| 1892.     | R.A. app.<br>h. m. s. | Decl. app.<br>° | Log. r.    | Log. Δ.    | Br.  |
|-----------|-----------------------|-----------------|------------|------------|------|
| Oct 6 ... | 7 45 22 ...           | +24 47.5        |            |            |      |
| 7 ...     | 48 30 ...             | 24 26.9 ...     | 0.2204 ... | 0.1763 ... | 3.71 |
| 8 ...     | 51 40 ...             | 24 5.6          |            |            |      |
| 9 ...     | 54 51 ...             | 23 43.6         |            |            |      |
| 10 ...    | 7 58 4 ...            | 23 20.9         |            |            |      |
| 11 ...    | 8 1 18 ...            | 22 57.4 ...     | 0.2077 ... | 0.1542 ... | 4.35 |
| 12 ...    | 8 4 34 ...            | 22 33.3         |            |            |      |

This comet on the 11th inst. will be found situated in the constellation of Cancer. It will lie very nearly on a line joining the stars  $\kappa$  Gemini and  $\delta$  Cancer, being about a third of the distance nearer the former than the latter.

COMET 1892 II. (MARCH 18).—The following ephemeris for Denning's comet we take from the *Astronomische Nachrichten*, No. 3118 :—

##### 12 Berlin Mean Time.

| 1892.      | R.A. app.<br>h. m. s. | Decl. app.<br>° | Log. r.    | Log. Δ.    | Br.  |
|------------|-----------------------|-----------------|------------|------------|------|
| Oct. 6 ... | 6 23 9 ...            | +11 54.0        |            |            |      |
| 8 ...      | 22 0 ...              | 11 6.3 ...      | 0.4250 ... | 0.3604 ... | 0.64 |
| 10 ...     | 20 43 ...             | 10 17.9         |            |            |      |
| 12 ...     | 19 19 ...             | 9 28.8 ...      | 0.4300 ... | 0.3539 ... | 0.65 |
| 14 ...     | 17 48 ...             | 8 39.1          |            |            |      |
| 16 ...     | 16 9 ...              | 7 48.9 ...      | 0.4349 ... | 0.3478 ... | 0.65 |
| 18 ...     | 14 23 ...             | 6 58.4          |            |            |      |
| 20 ...     | 6 12 29 ...           | 6 7.6 ...       | 0.4398 ... | 0.3423 ... | 0.65 |

NOVA AURIGÆ.—In some further notes that we have referring to the brightness and the spectrum of the Nova, we find that most observers estimate the star's magnitude to lie between 10 and 10.5. Herr Belopolsky, who has examined the star spectroscopically, has been able to see one or two lines; a later estimation of the brightest gave a wave-length of 501, while the second line proved too variable in brightness to allow of a sufficiently correct measurement.

To *Astronomische Nachrichten*, No. 3118, Mr. H. Seelinger contributes a very important article, in which he suggests an hypothesis which may be said to approach that put forward by Mr. Lockyer some time ago. He assumes (and a very fair assumption too) that the cosmos contains innumerable more or less elongated forms of very thin and small particles, and that the Nova was produced by a body rushing into one of these, so to speak, clouds. On entering this cosmical cloud, at once there would be a condition for producing heat, and therefore light, and we have only to imagine the cloud to be of varying thicknesses to account for the peculiar fluctuations which attended the light of the Nova. That such a case should take place seems in itself more probable than that of two bodies passing very near one another, and we already know that such streams as suggested do exist. Our November shower, for instance, is such a swarm, only on a scale very much smaller than that inferred above.

#### GEOGRAPHICAL NOTES.

UNTIL recently the Samoan calendar corresponded with the Australian, but on July 4 last a change was made by order of King Malietoa. Tuesday, July 5, was reckoned a second time as Monday, July 4, thereby coming into harmony with the American and European reckoning. Samoa, lying to the east of 180°, had retained the old system of time, superseded by the general acceptance of that meridian as the line at which the date is rectified by vessels at sea.

CAPTAIN LUGARD reached London from Uganda on Sunday night. It is gratifying to know that his three years' residence in equatorial Africa, and the severe strain of recent events, have not told adversely on his health. He will probably communicate the important geographical results obtained by him to a special meeting of the Royal Geographical Society in November.

THE arrangements for the next session of the Royal Geographical Society present several new features. In addition to the ordinary meetings it is proposed to give a special series of Christmas lectures to young people; to be followed by a course of ten weekly educational lectures, specially adapted for teachers, by Mr. H. J. Mackinder. The ordinary meetings as provisionally arranged begin on November 14 by a paper on his proposed North Polar expedition by Dr. Nansen. Mr. Joseph Thomson will follow with an account of his expedition to Lake Bangweolo. Captain Bower will describe his journey across Tibet, and Captain Lugard will recount his discoveries in equatorial Africa. Prof. Milne and Mr. Savage Landor have promised papers on Yesso, Major Rundell on the Siyin Chins, Mr. H. O. Forbes on the Chatham Islands, and Captain Galloway on Benin. It is hoped that Mr. Conway will return to describe his adventures in the Karakoram mountains. Apart from the records of travel to which the attention of the Society in its ordinary meetings has usually been mainly devoted, there will be papers dealing with the more general and scientific aspects of Geography. The Prince of Monaco will probably describe his experiments on the Atlantic currents, Sir Archibald Geikie will lecture on types of scenery, Prof. Bonney on the work of glaciers, Mr. J. Y. Buchanan on the windings of rivers, and Dr. Schlichter on his new photographic method of determining longitude.

THE last number of *Petermann's Mittheilungen* contains an important paper by Dr. Alois Bludau giving the co-ordinates for Lambert's equivalent area azimuthal projection of the map of Africa. An outline of the continent on this projection, the central point of which is on the equator in 20° E. long., shows the remarkable suitability of the map for representing Africa, the distortion being inappreciable.

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#### MAGNETIC INDUCTION.<sup>1</sup>

THE lecturer remarked that it was no less than forty-five years since the magnetic properties of materials had formed the subject of an evening discourse before the British Association. At the Oxford meeting in 1847 the lecturer was Michael Faraday, who had only a little while before made his great discovery of diamagnetism and been led to the splendid generalization that all substances are in one way or other, and in greater or less degree, susceptible of magnetic influence. And it was an interesting coincidence that in the same year, partly indeed at that same Oxford meeting of the Association, the foundation of the modern mathematical treatment of magnetism had been laid by that infant phenomenon, whom in the vigour of his maturity we were now learning to call Lord Kelvin. Discarding the arbitrary hypotheses of earlier theoretical writers, Lord Kelvin, then a stripling at Cambridge, had proceeded to give mathematical expression to the observations and intuitions of Faraday. In recent years the science of magnetism had advanced fast, keeping pace with the advance of its industrial applications. In common with other branches of electricity it had discovered the advantage of being useful. The debt which practice owed to science had been repaid with interest. In other departments of science it might be true that there were devotees whose chief pride in their work lay in their reflection that it could never be of any use to anybody: this temper of mind was not possible to an electrician. The language of electricians had passed with bewildering rapidity into Acts of Parliament and provisional orders of the Board of Trade, and the demands of industry had stimulated discovery and fostered exactness in measurement. It was the beneficent reaction of practice on science that had enabled the great work of the Electrical Standards Committee of the British Association to be brought to a successful issue. As a fruit of that work electricians were in high hope that this Edinburgh meeting would result in an international agreement with regard to the electrical units, so that whatever the Great Powers might find to differ about they would at least be of one mind as to the magnitude of the volt, the ampere, and the ohm. In the co-operation of Prof. von Helmholtz on the part of Germany, and of M. Mascart on the part of France, with Lords Kelvin and Rayleigh and their English colleagues, there were surely the elements of a Triple Alliance which should secure to the electrical world peace, not only with honour, but with precision.

The lecture of Faraday in 1847 had dealt with the condition induced by magnetic force in matter which was not ordinarily magnetic. Substances were broadly divisible into two classes, those which were strongly susceptible to magnetic influence and those that were only very feebly susceptible. The latter was by far the most numerous class, and it was with it that Faraday dealt in his lecture. The strongly magnetic substances were iron and its various derivatives, which passed by the general name of steel, also nickel and cobalt. A recent discovery by Prof. Dewar seemed to require that oxygen, in the liquid state, should be added to this list. The lecturer proposed to confine his attention to the phenomena of magnetization which were exhibited by the strongly magnetic metals. Let any one of these metals be submitted to the action of a magnetizing force such as would be produced if an electric current were passed through a coil of insulated wire surrounding the metal. As the current was gradually increased, the magnetization passed through three stages. It began very gradually; at first, while the current was still weak, there was but little magnetism developed. Then a stage came on in which the magnetic state was acquired with great rapidity; a small increase in the current now caused an enormous gain of magnetism. Finally, the process passed into a third stage, when the magnetism was again acquired slowly, and however much the magnetizing current was increased it was found to be impossible to force the magnetism to exceed a certain limiting value. This was the phenomenon of magnetic saturation. Recent researches had given definiteness to the rather vague idea which used to be expressed by this phrase, and it was now known not only that a limit existed, but what its values were in the several magnetic metals. The lecturer illustrated the three stages in the magnetizing process by means of the lantern, exhibiting curves which showed the connection between mag-

<sup>1</sup> Abstract of an evening lecture delivered before the British Association, at Edinburgh, August 8, 1892, by J. A. Ewing, M.A., F.R.S., Professor of Mechanism and Applied Mechanics, Cambridge University.